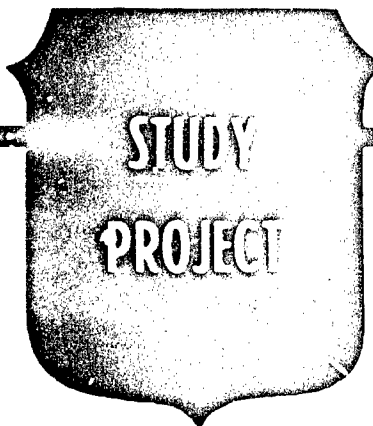


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# ENVIRONMENTAL TERRORISM

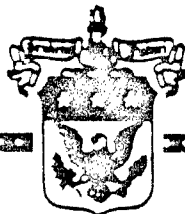


BY

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ENVIRONMENTAL TERRORISM

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# ABSTRACT

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The willful and wanton destruction of the environment by Saddam Hussein in the Gulf War raised deep concerns over deliberate, conflict-induced ecosystem damage. A corollary to that destruction is the concept of environmental terrorism: the employment of violence or threats of violence against the environment for political purposes. This study examines the lack of a definition of international terrorism and its subset, environmental terrorism. The susceptibility of the environment to terrorist attacks is reviewed to determine whether the target audience of terrorism, the world's population, is sufficiently concerned about the ecosystem to care about a terrorist attack. The vulnerability of the environment to damage is evaluated and found to be vulnerable at the local, regional and global levels. The roles of various international, federal, state and Army agencies in combating environmental terrorism are reviewed to see if changes are in order. Finally, several recommendations are offered to thwart the threat of environmental terrorism.

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## INTRODUCTION

Environmental terrorism, like all terrorism, is considered a form of low intensity conflict. The deliberate destruction of the environment has taken on a new interest as a result of the oil well fires started by the Iraqi forces as they were leaving Kuwait at the end of Operation Desert Storm. The environmental subset of terrorism is a relatively new concept and, given the extent of the pollution caused by those fires, although done in the name of warfare versus terrorism, has brought the issue to the forefront of international attention.

The purpose of this study is to provide a background on terrorism in order to understand the environment's relationship to it, to define environmental terrorism, to review the susceptibility and vulnerability of various elements of the environment to terrorism, to examine the existing mechanisms designed to combat environmental terrorism, and to recommend courses of action to thwart environmental terrorism.

### TERRORISM: THE SEARCH FOR AN INTERNATIONAL DEFINITION

The application of terror to obtain a group's objectives is as old as warfare. At some point in the history of conflict, a bifurcation occurred where warfare and terrorism diverged; where mankind decided that certain acts were acceptable on the field of conflict and others were labeled terrible. Terrorism wasn't called a form of low intensity conflict until September, 1985, when

Ambassador Robert Oakley as head of the Department of State's Office of Counterterrorism labeled it a "form of low-intensity warfare." The Joint Chiefs of Staff followed suit two months later and included the word terrorism in their definition of low intensity conflict.(1)

The environment as an exploitable entity has not been utilized by terrorist groups. The potential, however, exists and may become the next evolutionary step in their modus operandi. The success of the international community acting unilaterally, bilaterally or with broad consensus against terrorist groups has reduced other forms of terrorist actions such as hostage-taking, airliner hijackings and bombings. Given that older forms have decreasing payoffs, the susceptibility and vulnerability of the environment to terrorist acts may cause it to be the focus of the future. It then becomes in the collective best interests of society to examine this concept and develop a stance.

Before analyzing the term environmental terrorism it is instructive first to define the over-arching term and review its legal status. This will provide a foundation for understanding the development of a position with respect to the subset of environmental terrorism.

There seem to be as many definitions of the word terrorism as there are students of the subject. They range from Yonah Alexander's "the employment of threats of or the actual use of violence by some national groups to attain political, economic or social objectives in violation of law"(2) to the Israeli ambassador

to the United Nations (U.N.), Benjamin Netanyahu's "the deliberate and systematic murder, maiming and menacing of the innocent to inspire fear for political ends."(3) It must be noted that these are the well thought out opinions of learned individuals, but not internationally accepted definitions.

One organizationally accepted definition is offered by the Department of Defense (DOD). It has termed terrorism to be "the unlawful use or threatened use of force or violence against individuals or property to coerce or intimidate governments or societies, often to achieve political, religious, or ideological objectives."(4) It would be easy to accept the DOD definition and apply it broadly; however, when terrorism is a civil matter or international in nature and the U.S. lead agencies are the Departments of Justice, State and Transportation, the DOD definition holds little sway in a court of law outside DOD jurisdiction.

U.S. laws allow for the prosecution of terrorists under the jurisdiction of the United States. This jurisdictional boundary was extended to international waters recently, giving the Federal Bureau of Investigation (FBI), the executive agent for domestic terrorism, greater latitude in its counterterrorism efforts. International terrorism and terrorism against Americans outside U.S. jurisdictional boundaries are different matters. Congress, in passing the Comprehensive Crime Control Act of 1984 and the Omnibus Diplomatic Security and Antiterrorism Act of 1986, established federal jurisdiction over some crimes committed against Americans

overseas. However, the host country must agree to FBI involvement and extradition of the alleged terrorist in these situations.(5)

In order to form a basis upon which to resolve whether or not a crime has been committed at the international level where the majority of terrorist attacks occur, one needs to examine the international definitions and laws.

Upon examining international bodies with compliance powers, one is at a loss to find a definition of terrorism. The U.N. is recognized as the preeminent international body most likely to be able to address terrorism and enforce the collective will of its members. The U.N. has not been able to develop a definition for terrorism much less codify sanctions to be taken against terrorism in general. The precursor of the U.N., the League of Nations, likewise struggled with this concept. It reached a definition in its 1937 Convention for the Prevention and Punishment of Terrorism. This convention defined the term very broadly, and did not distinguish between international and civil conflict. Since only two of the 24 signatory nations ratified the convention, it did not go into effect.(6)

The difficulty behind such an international shortcoming is that should the states develop and codify a definition, then reactions against terrorists which employ methods of a like nature are also crimes. This would tend to limit the responses of states against which terrorism had been conducted. James Burnham echoes these sentiments from a civil rights perspective. He contends that counter measures may require anti-democratic principles and

infringe upon the civil liberties of the population at large as well as the rights of the alleged terrorists.(7) Furthermore, those states which support or sponsor terrorism are not likely to take the first step toward controlling terrorism, i.e., reaching a definition.(8) These states will likely participate in the formulation of a definition, but do so in order to prevent loopholes from closing or to create new obstacles to the process.(9)

The closest the U.N. has come to defining terrorism, in the view of Vernon Walters, the former U.S. ambassador to the U.N., was the 9 December 1985 General Assembly Resolution which loosely defined it as "acts which endanger or take innocent lives, jeopardize fundamental freedoms and seriously impair the dignity of human beings." (10)

Despite the lack of an over-arching definition of terrorism, the U.N. and the international community have not been completely ineffective in addressing the subject. Instead of a broad definition and law, there have been a series of act-specific conventions addressing terrorist actions. These include: the 1958 Geneva Convention on the High Seas, the 1982 U.N. Convention on the Law of the Sea, the 1963 Tokyo Convention on Offenses and Certain Acts Committed on Board of Aircraft, the 1970 Hague Convention for the Suppression of Unlawful Seizure of Aircraft and the 1971 Montreal Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation.(11)

Nations interested in combatting terrorism have taken bilateral

steps outside the aegis of the U.N. The United States and United Kingdom have worked together to take a tough stand against terrorism. They have elected to eliminate the political sanction as an excuse of terrorism, focusing on the crime itself and prosecuting terrorists accordingly.(12)

These hurdles are frustrating and one may assume that they stymie only international action. But such difficulties in achieving consensus also occur within the United States. In 1984, House Resolution 5613 was submitted, intending to prohibit aid to terrorist organizations. The same questions of civil liberty infringement, agreement on a definition, distinguishing between terrorists and freedom fighters and at what level support was given caused the bill to die in committee.(13) One is driven to wonder if progress is possible or is the effort merely a Pollyannaish utopia for the totally naive.

This piecemeal state of affairs is not restricted to the international arena. In the United States where one would expect to find a concise, unified approach to domestic terrorism, the FBI is charged with managing the federal response to terrorism without a comprehensive federal law addressing the issue. It is forced to base its anti- and counterterrorism efforts on several federal crime statutes.(14)

Until such time as a consensus on a broad international definition is reached, the act-specific conventions are better than ignoring the subject. Also, as many processes in democratic societies are incremental, that is, taken by evolution versus

revolution, a slow process may be preferable to too rapid a change which would lead to discontent and a lack of unanimity in application of the law. Even with a definition and a law, there is no reason to believe that this will eliminate terrorism any more than traffic laws stop speeding. It will, however, demonstrate a multinational resolve to be a world of principles, laws and due process for all and reinforce "international cooperation among like-minded nations."(15)

#### ENVIRONMENTAL TERRORISM: SOMETHING NEW UNDER THE SUN?

In developing a definition of environmental terrorism, it is first necessary to distinguish between environmental warfare and environmental terrorism.

The manipulation of the environment during conflict has been tried for centuries with varying degrees of success. Besiegers catapulted plague infected bodies over the walls of Kaffa during a 14th Century siege.(16) In 1938, the Chinese dynamited the Huayankow dike on the Yellow River to flood the lowlands, halting the Japanese Army.(17) The United States seeded clouds in an attempt to produce excessive rains and disrupt enemy activities in Southeast Asia during the Viet Nam War.(18) These examples of environmental manipulation were conducted within the limits of the existing laws of land warfare, as interpreted by the employing belligerent at the time. Today, international agreements better protect the environment against damage via warfare or modification through hostile means.

The concept of preventing hostile environmental damage dates back to 1907. Article 55 of the Hague Convention IV, Respecting the Laws and Customs of War on Land, states: "The Occupying State shall be regarded only as administrator and usufructuary of public buildings, real estate, forests, and agricultural estates belonging to the hostile State, and situated in the occupied country. It must safeguard the capital of these properties, and administer them in accordance with the rules of usufruct."(19) A law once written becomes subject to interpretation over the years and applied against the existing standard of the day. This convention, then, could form the basis upon which to try an individual for damage to portions of the environment as a fundamental element of the capital of another state.

A more recent convention, which is more specific and reflects an evolving international concern for the environment, is the 1977 Protocol I Additional to the 1949 Geneva Conventions. This protocol prohibits states from employing "methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment."(20) This protocol came on the heels of widespread U.S. use of herbicides, land clearing operations and cloud seeding in Southeast Asia during the Viet Nam War.

In 1982, the U.N. General Assembly passed the World Charter for Nature which secures nature against degradation through war or other hostile means. It passed by a vote of 118 to 1; the United States was the sole dissenter.(21)

The body of international law adequately addresses deliberate hostile attacks against the environment. The weakness in these laws is the caveat that the destruction of the environment is permissible where "such destruction is rendered absolutely necessary by military operations."(22)

Despite the obvious intent of preventing hostile manipulation or destruction of the environment, the rub is trying an environmental terrorist using these laws of the conduct of war. But at least the world community has codified its abhorrence of militant environmental destruction, a step in the right direction.

#### ENVIRONMENTAL TERRORISM: HOW SHOULD IT BE DEFINED?

The definitions of terrorism contain common elements: unlawfulness, force or violence, directed against people or property, designed to influence governments or societies and intended to meet a political goal. The inclusion of the environment in the process would be as an element against which an act is directed. It would still entail an unlawful act designed to influence, by force or violence, a government or society, with a political goal as its objective.

There are two choices for this expansion: modify the definition to read "...against individuals, property or the environment..." or consider that by injuring the environment one by extension injures an individual, or that the environment is the property of the people at large.

One end product of a definition is the ability to include it in

a law. There are two broad categories of law in societies. The most direct is a codified law wherein a code specifies what the law is and often the punishment associated with infractions. Such a system is found in governments descendant from the French system which is based upon the Napoleonic Code. In Louisiana, one finds vestiges of such a system. In contrast to a codified system, strict or with some leeway, is the English common law system. This system is based in large part on the past practices of people and the courts. Here a decision is often predicated on a law as tempered by case history. In instances where the law is subject to interpretation and judgement, the arguments for or against a defendant will always include a discussion of past decisions.

In order to successfully prosecute an alleged environmental terrorist via common law, the case law must contain a decision on environmental terrorism and be favorable, to wit: a decision for the prosecution. U.S. domestic case law involving violent acts impacting on the environment are based upon acts committed against property, e.g., sabotage of oil and gas pipelines, damage to electrical power lines, etc.

Internationally, case number 7150 of the U.N. War Crimes Commission at Nuremberg set a precedent for trying individuals for wanton destruction of the environment. Ten German civilian administrators were tried as war criminals for their "ruthless exploitation of Polish forestry", of "pillaging" and "the wholesale cutting of Polish timber to an extent far in excess of what was necessary to preserve the timber resources of the country." They

were implementing a Nazi policy during a period of belligerent occupation.(23) This case was singular and was tried by the victors. As such its applicability to situations of a terrorist acting for political purposes could be seriously questioned.

The argument to apply case law to situations under the existing DOD definition of terrorism requires a nexus to an individual or group, or to the property of an individual or group such as a corporation or government body. This leaves a loophole in the ability to declare an environmental terrorist act unlawful for not every conceivable incident would include a specific individual or group. To side step the issue, a governing body can always contend that a hostile act committed against the environment is an act committed against the citizens of that body.

Crimes against the people at large are those crimes committed by hostes humani generis, or the enemies of the people. Laws of this type have been incorporated into U.S. law. The statue against piracy, a crime committed by enemies of the people, was originally enacted in 1819 in Title 18 USC 1651.(24) The 1949 Geneva Convention IV Relative to the Protection of Civilian Persons in Time of War, Article 53, considers the public at large when it prohibits destruction of "real or personal property belonging individually or collectively to private persons, the state, public authorities or social or cooperative organizations."(25)

An approach to consider the environment the property of the people at large is possible, but the verdict is in the hands of the jury which may take exception to the argument. The preferred

procedure is to close loopholes by including the term environment in the definition of terrorism and thus deem it an unlawful act without resorting to extensions of case law. The DOD definition for example, becomes "...against individuals, property or the environment..."

There are attendant problems with this inclusion. The idea of an individual or property is commonly accepted by society. The concept of precisely what constitutes the environment is open for discussion even in America. Before a law can be passed or an individual put before a trial and assured due process, society must reach consensus on this term, otherwise an appellate court may overturn a decision under the concept of the lower court being arbitrary or capricious in applying a definition.

The DOD dictionary of terms does not contain the word environment. Referring to Webster's Unabridged Dictionary, it is defined as "the whole complex of climatic, edaphic and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival."(26)

Other sources of the word are the European Communities Council Directive of 21 December 1978 (79/117/EEC). Their collective definition is "The relationship of human beings with water, air, land and all biological forms."(27) The Geneva Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, May, 18, 1977, indirectly defines the environment in addressing environmental modification techniques. This term is defined as "any technique for changing - through the

deliberate manipulation of natural processes - the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere or of outer space."(28)

All of these definitions include the entire range of life forms, the habitats in which they dwell and the interrelationship among them. The definition put forth in Webster's Dictionary is a comprehensive one and is widely accepted. This definition then can provide the framework for defining environmental terrorism.

Environmental terrorism needs to be defined. The existing laws and definitions leave loopholes which may provide escape routes to an environmental terrorist. It is in the best interests of international society to close them.

#### SUSCEPTIBILITY: DOES ANYONE REALLY CARE?

Terrorism can be applied at all levels within a state, region or internationally. Likewise environmental terrorism can be applied at the same levels. The efficacy of terrorism is dependent upon the reaction of the target audience. If the audience does not believe that the environment is susceptible to damage, it is unaffected by the act. The terrorist then fails to achieve his objective and is forced to other methods or objects of his unlawfulness. Webster's Dictionary defines susceptibility as being of such a nature as to admit or permit an action.(29)

A terrorist act directed against the environment twenty-two years ago on the original Earth Day would probably have gone unnoticed and would have been ineffective. The environment was not

susceptible to terrorism; the population was not sufficiently aware of or concerned about the environment to react as the terrorist intended. When the Cuyahoga River in Cleveland, Ohio can burn or the Torrey Canyon in 1967 can spill millions of gallons of crude oil without evoking grave concern, then a terrorist act bent on damaging the environment for political purposes would receive about the same reaction.

In the intervening decades, the world's population has come to realize the importance of the environment and the effect of mankind on it. Western societies such as the United States, Canada and Germany are very much concerned about the effect that industry and the individual have on the ecosystem. These societies, their governments and special interest groups have taken psychological, legal and economic steps to heighten the awareness of their populations and to mitigate their impact on the environment.

This evolution of concern has been strongly influenced by economic factors.

The debate over acid rain is an argument for reducing the production of industrial emissions which cause acid rain. The insidiousness of the issue is that the recipient of the brunt of the degradation of the flora and fauna caused by acid rain is commonly another downwind nation. A large portion of Canada's acid rain begins by the burning of fossil fuels in the United States.(30) The majority of Norway's and Sweden's acid rain begins in the same manner in the United Kingdom.(31) These situations are international in nature and corrective measures are heavily

influenced by economic forces within the polluting nation.

One test of the inculcation of the environmental ethic in the populace is whether or not a society will of its own accord spend resources for purely ecological purposes. In the United States, recent laws require that the decisionmakers give equal consideration to the environment and economics. The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (P.L. 96-501) mandates this consideration in balancing the often competing demands of hydroelectric power against those of anadromous fish.(32) The Federal Energy Regulatory Commission in its licensing and relicensing processes is required to consider environmental and recreational concerns on an equal footing with a dam's value as a power generator.(33)

The cases for preservation of the old growth forest habitat for the Northern Spotted Owl and preservation of wild stocks of anadromous fish in the Columbia River basin revolve around economic considerations. The effect, of the various plans to save the owl, on jobs in the timber industry vary from 33,000 lost to 20,700 lost.(34) The final cost to the electricity rate payers for hydropower system modifications to enhance anadromous fish is still undetermined.

The one society in the world most concerned about the local, regional and global environment is the United States; but America still looks at the bottom line before taking action. Given this stance, one can better appreciate the level of concern for the environment of less fortunate societies; societies without the

luxury of devoting discretionary resources to the ecosystem. A terrorist act directed against the environment would be viewed quite differently by a nation which daily struggles against its own harsh environment for mere survival. This disparity between nations over the importance of the environment would have to be bridged prior to achieving a consensus on the criminality of environmental terrorism in any international forum.

Fortunately the appreciation for the effect a society has on the environment is spreading to other nations. As noted, Canada, Sweden and Norway are very much concerned about the international effects of pollution. The recent visibility of the industrial practices of the former USSR and Eastern European nations has led to widespread disgust over the irresponsible destruction of their environments. China realized the burden of over-population on the agricultural capacity of its ecosystem and attempted to control this problem by limiting family size. As a course of action in its program, China tried forced abortions of women who had already given birth to one child.

The world community is moving, albeit slowly and erratically, toward a general awareness of the interrelationships of elements of the global ecosystem. As such, a body of nations may be more receptive to achieving consensus on environmental terrorism than on other forms of terrorism which impact outside their societies.

#### VULNERABILITY: IS THE ENVIRONMENT AN EFFECTIVE TERRORIST TARGET?

In order to understand objectively the value of the environment

to a terrorist, it is necessary to evaluate its vulnerability. Webster's Dictionary defines vulnerability as capable of being wounded, defenseless against injury, open to attack or damage.(35)

Public awareness of the environment did not blossom until authors such as Rachel Carson in 1962 called our attention to the host of pollutants we were releasing into the environment. The haunting thoughts of a silent spring brought about by DDT and other pesticides sparked a theretofore unknown concern for the earth. Previously mankind was content to accept the damage and to move on to another area when he made one uninhabitable or unproductive.

These incidents can be found throughout the history of Homo sapiens; they are not limited to recent, highly industrialized nations. The primary cause of the demise of the Mayas in the area of the Yucatan Peninsula is debated among archaeologists; but a common theme with varying degrees of support is the overtaxing of their crop producing environment.(36) The salinization of irrigated fields to the point of sterilization plagues farmers worldwide. This difficulty was observed in ancient Mesopotamia around 3500 to 1700 B.C. as the Sumerian cities of Agade, Ur and others lost their agricultural base.(37)

Some groups dismiss the environmental degradation to date as inconsequential and would therefore conclude that it is not susceptible to terrorism. The seemingly inexhaustible ability of the ecosystem to absorb damage has not been overwhelmed and a terrorist group could not effect a large enough event to bring about political change. This rationale parallels the thinking of

U.S. industry up until the late 1960's. Since then scientific analysis has shown how damaging mankind has been and more importantly how close to irrevocable damage some systems are.(38) Ironically the stage has been set, by people acting in the best economic interests of societies around the world, for a terrorist group to provide the final push to the ecosystem and send it over the brink into disaster. It is difficult to quantify precisely how close to failure these systems are; however, there is no doubt that mankind has been accelerating the damage.

The interdependence of the elements of the environment is complex and in years past not completely understood. Only recently, with the ability to measure small changes over a wide area and to computer model systems, has the effect of mankind on the environment begun to be understood. The discovery that there are holes in the ozone layer over the South Pole has corroborated the theory of ozone depletion, caused principally by chlorofluorocarbon discharges. This depletion will result in an increase in ultraviolet radiation at the earth's surface. Attendant increases in cancer in humans, and damage possibly leading to extinction of fragile life forms which often form the base level of the food chain, may result. The reading of the earth's temperature history via the study of ice cores from Antarctica has shed light upon the theory of the greenhouse effect. This effect, caused in part by the production of carbon dioxide from burning fossil fuels, will lead to increases in the earth's average temperature, exacerbating drought and subsequently crop

failure. Neither of these two forms of pollution have occurred overnight. They have, however, placed the earth's environment in a state where the ability of the environment to accept further degradation and still rebound is in serious doubt.

The environment includes more than the land, sea and air. It includes the living organisms that inhabit those realms. Lynton K. Caldwell lists genetic loss, the extinction of species and subspecies, as the most critical environmental issue facing the international community.(39) The concept of genetic diversity is at the heart of the anadromous fish and the spotted owl issues in the Pacific Northwest.

A lack of genetic diversity and an over dependence on a single crop agricultural system contributed to the Irish potato famine of the mid 1800's. The original potato strains were imported from the Andean region of South America where thousands of wild strains existed. When a blight destroyed one third of the Irish crop during a six year period, millions died. It took years to revitalize potato production through importation of resistant strains from South America. Had the growers appreciated the concept of genetic diversity, then an early infusion of other strains would have ameliorated the famine.(40)

Several agricultural groups around the world have seen the necessity to maintain genetic diversity as fewer and fewer modern high yield strains of corn, rice and wheat are replacing the once numerous wild strains. They have developed seed banks such as the National Seed Storage Laboratory in Ft. Collins, Colorado, to

preserve as many wild strains as possible to hedge against disasters like the Irish potato famine.(41) The parallel between the loss of a strain and its impact on mankind is as critical to the world as was the potato to the Irish.

The incidents discussed so far have occurred in both developing and advanced societies. The ability of a society to cope with a degradation or loss of a portion of its environment, such as extinction of species or destruction of crop land, is a function of the society's vigor and adaptability. An advanced society is better equipped to ameliorate the effects on their populace from a terrorist attack on the environment than is a developing one.(42)

The vulnerability of the environment to terrorist attack can be local, regional or global. It's the reaction of the audience that matters. Pollution sources are categorized as point sources or non-point sources. This is a function of whether the entry point of the material is concentrated, such as a pipeline discharge, or widespread, such as pesticides spread over a large farm and eventually flowing into a stream. By the same token, environmental terrorism can be inflicted by a point means or a non-point means.

On the local level an attack against a utility such as a water supply system or an electrical power system does affect the immediate health and environment of the consumer. These incidents are addressed under the existing DOD definition of terrorism: "... violence against individuals or property ...", hence no need exists to place them under an environmental terrorism umbrella.

However, the effect of such acts can extend beyond the immediate

concern of the consumer. Loss of power can cause subsequent environmental damage should systems such as sewage treatment plants, chemical effluent control systems or petroleum storage and handling systems be immobilized with a resultant discharge of pollutants into the environment. Under the DOD definition, the sabotage of the utility, since it is a property, is considered terrorism, but the subsequent and perhaps more disastrous effects on the ecosystem are not.

Utility system owners are very concerned about their vulnerabilities. The vulnerable points of extensive systems like the Pacific Northwest hydroelectric power grid and the California aqueduct are generally not the production facilities such as the dam or its switch gear. These facilities are secured and under surveillance. The operators conduct threat analyses and are prepared to respond to outages.

The distribution networks which provide the service to the end user often have loops or redundancies built in which allow the utility company to overcome a localized outage.

The vulnerable points are within the transmission facilities which carry the power or water from the production facility to the distribution network. The electrical lines and towers stretch for hundreds of miles as do the aqueducts. It is not economically feasible to monitor and directly protect every mile of these systems, hence their vulnerability. This vulnerability to sabotage was recognized by the Nazis in early World War II. When a group of saboteurs was discharged on the Atlantic Coast in 1942, amongst

their targets were the hydroelectric plants on the Niagara River and New York City's water supply.(43)

The effects of the loss of electrical power were abundantly illustrated on 9 November 1975 with the activation of an incorrectly set automatic safety switch at the Sir Adam Beck power plant in the U.S.-Canadian Niagara River system. This simple mechanical oversight plunged New York City and a surrounding 80,000 square mile area with 30 million people into a 13 hour blackout and chaos.(44) The city survived, but not without substantial loss of confidence in the utility. Such loss of confidence would be multiplied exponentially with a coordinated program to discredit the government through repeated terrorist-induced outages.

Building redundancy into all aspects of a system would render the terrorist's tasks more difficult, but redundancy is expensive.

A corollary to a direct attack on the infrastructure of a utility system is an attack on the source for the utility. An economical water supply system depends upon a relatively clean source. A highly sophisticated water purification system can remove all forms of contamination, but the cost to remove these contaminants rises greatly with the amount and complexity of pollutants. The fouling of the waters of America provides a case study of how to undertake environmental terrorism.

The legacy of Love Canal and the chemical industry along the Niagara River will long remain in the consciousness of the American public. They now know the effects of dioxin and polychlorinated biphenyls (PCB's). They have come to fear these chemicals in

minute quantities and to understand that the existing water treatment plants are unable to remove these pollutants. Punishment for injecting these or similar chemicals or biological agents into a water source prior to its entry into the collection point versus damage to the utility infrastructure does not strictly fall under the umbrella of the "... against property..." aspect of the terrorism definition, and although the nexus to the "... against individuals..." aspect is more distinct, it may not hold in a court of law.

The vulnerability of the environment to terrorist activity also applies to non-point sources of terrorism. In many regions around the world, the margin between survival and starvation is thin. In these areas, a terrorist would be able to exploit this margin more readily than in an area with a wide margin to buffer the terrorist attack. With a non-point approach to terrorism, the terrorist may be required to act over a large area and over a longer period of time. The course of action selected may be an indirect one as well.

These examples are large in scale and a small terrorist group may be hard pressed to make credible so extensive a threat to the world community. However, terrorists could easily produce a smaller scale credible threat. One such scenario is the destruction of the ecosystem-agricultural balance in the Philippine Islands. These lands, like other forested lands, are often clear cut and burned prior to planting crops. Once cut, the forests are no longer in place to retard erosion and the loss of top soil. The

deforestation can lead to altered regional hydrological cycles and precipitation patterns and a reduced ability of the land to absorb flash floods. The resultant increased run off and erosion can clog irrigation channels and silt reservoirs and waterways.(45) Any of these factors acting alone leads to reduced agricultural output, hunger, discontent and a desire for political action. Acting in concert, the effect on the agricultural capacity of the region is geometrically exacerbated. Where the state does not have an effective system to address these pressures or where the mechanisms to effect political change are absent or weak, terrorism offers a mechanism for redress.

Not only is the foregoing chain of events possible, it has happened, but not as a result of terrorism. In 1986, the Philippine government and the European Economic Community commissioned an Integrated Environmental Plan to study the island of Palawan. They found that by 2007, half of the 36,000 hectares of irrigated farm land on Palawan will be unsuitable for crop production due to the hydrological effects of deforestation.(46) Currently the arable land supporting the world's 4.5 billion people amounts to 1.5 billion hectares.(47) The 18,000 hectares affected on the island of Palawan would go unnoticed on a global scale, but with a world average of 3 people supported per hectare of farmland, this will effect over 54,000 people on Palawan.

If the environment is as susceptible and vulnerable to terrorism as portrayed, then why has it not been utilized? In answering this question, two aspects emerge. First, the philosophical constraints

on an environmental terrorist and second, the effort required to produce an event large enough to achieve the desired effect.

Stanley L. Wiener delineates the speculative reasons why terrorists have not employed the environment when he examines the terrorist use of biological weapons. Given the parallel, abhorrent nature of these two forms of terrorism, these reasons also apply to environmental terrorism. His rationale includes satisfaction with conventional weapons, fear of disapproval by their constituency because of its 'dirty' nature, control of the terrorist group by a sponsoring state, lack of expertise, fear of the hazard to the perpetrators, fear of an extreme response by the target nation, concern about the loss of possible support for the terrorist cause by uncommitted members of the world community, and lack of a successful prior attack that could serve as a precedent and model for the use of such agents.(48) There is a lot of substance to these reasonings; however, to assume that these will continue to thwart environmental terrorism is myopic.

The second reasoning tends to contradict the vulnerability of the environment to attack at the local level; but the fact remains, to produce a large scale effect with global attention, substantial effort is required.

In evaluating the effort required, one may compare the magnitude of the polluting effect of industrialized society to the polluting effect of the Iraqi destruction of Kuwait's oil industry. One case in point is a comparison between the crude oil spilled from the 1989 Exxon Valdez accident in the Prince William Sound and the oil

deliberately released by Iraqi forces in the Gulf War. The Exxon Valdez spilled 262,000 barrels of crude oil, an amount roughly equal to the 250,000 barrels annually spilled in the Persian Gulf due to industrial accident and error during peace. During the Gulf War, 4 to 6 million barrels were spilled on the ground and into gulf waters by Saddam Hussien.(49)

The air pollution caused by the sabotage to the Kuwaiti oil wells exacerbated the ground and water pollution caused by the spilled oil. Approximately 800 wells were damaged, over 600 of which were ignited. The last of the wells was capped on 6 November 1991, eight and a half months later. Those 600 plus wells during the period they were all burning, consumed 4.6 million barrels per day, the amount of U.S. daily oil imports. They created as much heat as a 500 acre (0.78 square mile) forest fire and produced 12,000 metric tons of soot per day, equal to 10% of the particles emitted daily by worldwide biomass burning. They produced 1.9 million metric tons of carbon dioxide per day, equal to 2% of the world's daily production of carbon dioxide from fossil fuel and biomass burning. And they produced 20,000 metric tons of sulphur dioxide per day, equal to 57% of the sulphur dioxide generated by U.S. electric utilities per day.(50) Discounting the psychological difference between industrial pollution for economic purposes and polluting for terrorist purposes, the amount of polluting required to achieve notice is extensive.

The large scale measures necessary to achieve an effect on the environment similar to the Gulf War oil pollution exceed the

capability of most terrorists. The groups most likely to have access to the resources or technology to produce such an effect are state-supported or state-sponsored. The range of terrorist actions approaches the unlimited when a group has the resources of a determined state behind them.

With state support or sponsorship, chemical, biological and nuclear terrorism become more attainable. These forms of environmental manipulation are in addition to those discussed earlier from the Gulf War, the Viet Nam War, and the Second World War in China and Poland. There are also many relatively low technology means available. The chemical industry produces many chemicals for agricultural and industrial purposes which can double as terrorist instruments. It would be impossible to so strictly control these as to preclude their acquisition by terrorists. Biological elements available to terrorists are more limited, since those with a high degree of toxicity are tightly controlled, such as anthrax. Nuclear terrorism could be achieved through dispersal of nuclear materials or wastes or by the destruction of a nuclear plant. The accident at the Chernobyl nuclear facility rendered a quarter of Byelorussia's farmland unusable, and experts believe that one fifth of the population should be relocated as a result of the radiation. (51)

The waging of environmental warfare as discussed by Arthur Westing in his work of the same title (52), offers a plethora of mechanisms available to states and terrorists to manipulate the environment. The author recognizes the extensive effort required

to achieve a noticeable effect, efforts beyond groups without state backing. Within the realm of environmental terrorism, those who are state-sponsored and state-supported pose the largest threat, hence the source of greatest concern for target audiences.

The production of pollutants via industrial and agricultural mechanisms is all too often accepted as an unfortunate byproduct of creating improved standards of living for a society. Thus, it is at least tolerated until less polluting mechanisms are implemented. The production of pollution as a form of terrorism or war, such as the situation in the Gulf War, is not designed to improve mankind's lot, hence is viewed abhorrently and is unacceptable.

Saddam Hussein's intent in igniting the oil wells and spilling oil was not for tactical military gain, rather to smash the Kuwaiti oil industry, one of his primary goals in the Gulf War.(53) However, should he be tried under the existing laws for hostile manipulation of the environment, he is certain to invoke the concept of military necessity as his first defense.

The amount of oil deliberately spilled by the Iraqis equaled 20 years of accidental spills in the Gulf. The pollution from the burning wells equaled from 2% to 57% of global air pollution in comparison to selected ongoing human activity. One must not dismiss the effect of Saddam Hussein's actions, but the ecological havoc fell short of what mankind does to his earth daily.

#### PROTECTION: WHO'S HOLDING THE BAG NOW?

The vulnerability of the environment to terrorist attack is high. Whether the terrorist elects to employ a point or non-point approach to manipulating the environment for political purposes, the subsets of the ecosystem are largely unprotected.

In evaluating what is being done to protect the environment from terrorism, two broad mechanisms are available. They are summarized as antiterrorism and counterterrorism. Antiterrorism seeks to thwart terrorist actions through defensive measures to reduce the vulnerability of individuals and property, (54) while counterterrorism consists of offensive measures taken to prevent, deter and respond to terrorism. (55)

Both mechanisms are applicable to environmental terrorism. Both procedures are being implemented to varying degrees.

Internationally, the mechanisms to deter and respond to environmental terrorism are ad hoc or, if a priori, bilateral. In the Gulf War aftermath the U.N. coordinated the sixteen nations surveying and analyzing the extent of pollution caused by the Iraqi destruction of Kuwait's oil infrastructure. This effort was sponsored by dozens of agencies and industrial organizations from those nations. The data are to be placed in the public domain for use by all. (56)

The cleanup of the pollution did not proceed as rapidly as it had in other massive spills. Comparing the sense of urgency over the Gulf War spill to that of the Exxon Valdez spill, the

international team addressing the gulf cleanup opined that the much smaller Exxon Valdez spill "evoked a response 20 times as vigorous." (57) Despite the global, interrelated nature of the ecosystem, the international response to an environmental terrorist attack depends greatly on the nation or nations directly effected.

At the U.S. national level, the administration has assigned lead responsibilities for antiterrorism and counterterrorism to three cabinet level agencies: the Departments of Transportation, State and Justice. The Department of Transportation and its Federal Aviation Administration are responsible for aviation terrorism, such as hijackings, from the time the exterior doors on the aircraft are closed at the beginning of a flight until the exterior doors are opened at the end of the flight. The Department of State is the lead agency for terrorism against U.S. citizens and property overseas. The Department of Justice's FBI is the lead agency for terrorism within the jurisdictional boundaries of the United States. (58)

The Departments of State and Justice have developed effective working relationships at the international level. These groups are designed to share information about terrorist groups and provide a synergy which multiplies the efforts of individual nations through mutual cooperation. The FBI participates in such multinational fora as: INTERPOL and its Counterterrorism Unit, established in France in 1986; the TREVI (Terrorism, Radicalization, Extremism, Violence International) Group, established in Luxembourg in 1976; the Quantico, Virginia, Working Group (QWG) and the Italian-

American Working Group (IAWG). These groups do not relinquish sovereign jurisdiction, but exchange data to combat terrorism.(59)

Executive Order 12656 of November, 1988, assigns coordinating responsibilities to the Department of Justice. It in turn delegated these to the FBI. The FBI developed a program which parallels the U.S. Army's. The elements of the FBI's system are an infrastructure vulnerability/key asset plan, establishment of liaison with the owners and operators of those assets, and the formation of contingency plans designed to prevent and if necessary respond to a terrorist attack. Coordination of this planning process occurs at the government agency, military, private industry and independent research group levels.(60)

Other agencies play a role such as the Office of Technology Assessment, a non-partisan advisory group which advises Congress on matters such as federal research and development of technical tools to combat terrorism.(61) Another office with a critical role is the Federal Emergency Management Agency (FEMA). Its mandate in executive order and statute is to "channel our efforts toward the coordination of preparedness and planning in order to reduce the consequences of major domestic terrorist incidents, and toward the recovery activities required as a result of those consequences."(62)

FEMA coordinates its planning and preparedness in a variety of ways. It relies upon a resource agency, such as the Department of Energy in terrorism matters affecting electrical energy, for detailed expertise and regulatory authorities. It also looks to

these agencies for the lead in restoration and recovery from an event. (63)

The philosophy of a military commander being responsible for everything is well accepted. However, the majority of potential terrorist targets are non-military. They are civilians residing in their communities, surrounded by their environments. What is the philosophy of the civilian leadership with respect to them? Are they and their environments as well protected as a service member's?

The responsibilities of the Departments of Justice, State and Transportation have been examined. They are the lead agencies for domestic, overseas and in-flight terrorism. The designation of these three departments as the leads does not relieve the governmental leadership of its responsibility to prepare anti- and counterterrorism responses. Donald A. Devito of the New York State Emergency Management Office summarized the view of the non-military leadership with:

"I am a representative of the community of emergency managers - public safety officials encompassing every discipline for the protection of life and property throughout the communities of our nation. We are not counterterrorists. It is not our function to prevent the terrorist threat, to contain terrorist activity, nor to apprehend the terrorists themselves. Rather it is our function to assist the chief executive officers of our respective governments - whether mayor, governor or President - to prepare for, respond to and recover from an act of terrorism or the credible threat thereof." (64)

At the State level, Devito's observation places the onus directly upon the governor as the chief executive officer.

At the local level of government, similar approaches are used to

provide this coordination.

Agencies singularly designed to address environmental terrorism do not exist. The federal, State and local views are that the consequences of terrorism are similar to those of any massive catastrophic event such as a flood or earthquake.(65) The same end products are necessary: command and control, fire protection, sanitation, debris removal, potable water, shelter, medical assistance, communications, law and order, restoration of services.(66) A separate organization to address environmental terrorism would be redundant and would not benefit from experience with natural disasters. As Wm. Jones of FEMA's National Preparedness Directorate puts it: "inventing a new organizational architecture under stress would be unwise."(67)

The key to success is a crisis management structure that facilitates interagency cooperation and minimizes competition and disruption. It must have a streamlined structure for efficiency and positive personnel attitudes for effectiveness.(68)

The assignment of lead responsibilities to the FBI to combat terrorism does not relieve the military commander of the responsibility to prepare for and conduct anti- and counterterrorism actions to protect property and personnel. Army Regulation 525-13, The Army Terrorism Counteraction Program, is very explicit about the staff and command responsibilities for the program. It requires the installation commander to "establish contingency plans to respond to any major disruptions on installations, including both threats and attacks," and to "ensure

procedures are established with appropriate local agencies."(69) Major disruptions on installations, units and facilities are defined as "acts, threats or attempts to commit such acts as kidnapping, extortion, bombings, hijacking, ambushing, major weapons thefts, arson, assassination, and hostage taking on a military installation, unit or facility. Acts that have potential for widespread publicity require special response, tactics and management."(70)

The concept of environmental terrorism and the responsibility to respond to an attack against the environment must be inferred from this regulation. Often the opportunity to affect the environment of an Army installation is available outside the jurisdictional boundary of the commander. In these instances the requirement to coordinate with "appropriate local agencies"(71) must include agencies involved with the environment. Granted, the commander is ultimately responsible for everything that happens on his installation, but a doctrinal entry about the relationship of the environment to the well-being of the installation may be in order.

Training Circular (TC) 19-16, Countering Terrorism on U.S. Army Installations, addresses the implementation of anti- and counterterrorism requirements. Its focus is on a terrorist attack against property or individuals.

A key player in addressing environmental terrorist attacks against utilities, water sources, vegetation and the like is the Director of Engineering and Housing (DEH). He oversees installation utilities whether generated on post or purchased from

a local utility. He is responsible for natural resource management and fire fighting. Yet the role played by the DEH in the TC is to provide information on the layout of buildings and the acquisition of barricade and like materials in support of a terrorism response team. He is invited to planning group meetings almost as an after-thought, as an individual who "would be a useful member" as opposed to the public affairs officer who is recognized as a central, critical member.(72)

The development of a threat analysis upon which so much depends does not address environmental terrorism. The Installation Vulnerability Determining System is silent on the issue of utility system or environmental terrorism vulnerability.(73)

Serendipitously, the recent actions by environmental special interest groups and governmental agencies enforcing environmental clean air and clean water standards have given the DEH a firm foundation in how to prevent damage to the environment. The same philosophies and procedures can be utilized to prevent or mitigate terrorist damage to the installation's environment. Additionally, the DEH plans for utility outages as a matter of course in order to ameliorate the impact of a scheduled or unscheduled outage of a utility. Hence, the system is not starting from scratch; the thought and reaction processes are in place. However, emphasis on the possibility of an attack on the environment by a terrorist group should be addressed up front to minimize the chaos associated with such an attack.

### SHORTCOMINGS: WHERE DO WE GO FROM HERE?

The environment is susceptible and vulnerable to terrorist attack. The international and national communities have addressed terrorism and its subset, environmental terrorism, in some fashion, but there are improvements to be made.

Internationally, a better definition or at least a better understanding of the legal terms terrorism and environmental terrorism are in order. The act-specific conventions of the U.N. have enjoyed success in helping to eradicate or control terrorism, but these are limited in scope. The potential for mass casualties via a concentrated attack on the environment could eclipse by orders of magnitude the worst terrorist attack to date. It would not be in the best interests of any society to wait for such an event or series of events to decide to take an act-specific stance against environmental terrorism. The preferred alternative is for a clear U.N. definition of terrorism to include environmental terrorism. Existing laws of warfare address environmental manipulation but pertain to combatants, not terrorists striving for political change. In the absence of a consensus on such a convention and renouncement of the use of the environment for terrorist purposes, then an unequivocal stance by the United States and its friends and allies renouncing environmental terrorism would place others on notice of our resolve.

The susceptibility of the environment to terrorist attack is a function of the reaction of the audience. There is a band within which a terrorist may achieve his effect. If the population does

not care about the environment, then a terrorist attack against the environment will go unnoticed. On the other end of the spectrum, if the population is very highly concerned about the environment, then the population will react very strongly to a terrorist attack, perhaps going to extreme lengths in eliminating the terrorist group. Currently the concern of the world community for the environment varies from militant, with groups such as Green Peace and Earth First, to blissful ignorance. The trend is for increased awareness and, with it, concern. However, at the rate of evolution of concern, a world-wide consensus leading to elimination of any environmental terrorist group is not in the near future. A program for accelerating the awareness and concern for the global ecosystem is in the best interests of the world at large. With that program, by necessity, will be actions by industrial and agricultural groups to mitigate or eliminate their own adverse impacts upon the environment.

The world community, or its leader acting unilaterally, must not allow environmental terrorism to stand. It must set the proper precedent and convict the first offender.

The vulnerability of the environment cannot be effectively reduced. The interrelationships of the subsets of the ecosystem have evolved over aeons. The most one can do and should do is to continue research into the effect that mankind is having on these components to better understand these effects and how to ameliorate them.

Through anti- and counterterrorism measures, a society can

remove environmental terrorism from the terrorist's arsenal. By planning and practicing at every echelon of international, national, state and local government, by hardening systems and by reducing system vulnerabilities, societies can reduce the opportunities for and effects of environmental terrorist attacks. The fundamental mechanisms to achieve these ends are in place. Periodic practice involving all participants is vital to maintaining the proper vigilant posture.

The environmental activists look upon planet earth as a interrelated system of elements in delicate balance. Their concern stems from a strong belief in preserving the only ecosystem available. A terrorist bent upon turning that system against mankind for political purposes is an enemy of the people and must be recognized and dealt with as one.

#### END NOTES

1. Richard J. Erickson, "What International Law Approach Should Be Taken Toward International Terrorism?" Terrorism, 1988, p. 115.
2. William F. Fox, "Legal Aspects of Terrorism," Terrorism, 1989, p. 297.
3. Benjamin Netanyahu, Terrorism: How The West Can Win, p. 8.
4. Joint Chiefs of Staff, Joint Publication 3-07, p. GL-9.
5. Oliver B. Revell, "Structure of Counterterrorism Planning and Operations in the United States," Terrorism, July-Sept 1991, p. 136.
6. Central Intelligence Agency, Annotated Bibliography On Transnational And International Terrorism, p. 162.
7. Ibid., p. 170.
8. John F. Murphy, "The Need For International Cooperation In Combating Terrorism," Terrorism, Nov-Dec 1990, p. 384.
9. Mary Mochary, "Legal Aspects Of Terrorism," Terrorism, 1989, p. 306.
10. Murphy, p. 386.
11. Rett Ludwikowski, "Legal Aspects of Terrorism," Terrorism, 1989, p. 299.
12. Mochary, p. 306.
13. James Wooten, "Legal Aspects of Terrorism," Terrorism, 1989,

- p. 314.
14. Revell, p. 135.
  15. Central Intelligence Agency, p. 179.
  16. Stanley I. Wiener, "Terrorists Use of Biological Weapons," Terrorism, Apr-June 1991, p. 130.
  17. Arthur H. Westing, ed., Environmental Warfare: A Technical, Legal, and Policy Appraisal, 1984, p. 6.
  18. Ibid., p. 5.
  19. Ibid., p. 36.
  20. Ibid., p. 39.
  21. Ibid., p. 38.
  22. Ibid., p. 36.
  23. Ibid., p. 37.
  24. Ludwikowski, p. 300.
  25. Westing, p. 36.
  26. Philip B. Gove, ed., Webster's Third New International Dictionary, p. 760.
  27. Bernd Ruster, International Protection of the Environment, Treaties and Related Documents, Vol. XXIII, p. 324.
  28. Ibid., Vol. XV, p. 7905.
  29. Gove, p. 2302.
  30. John E. Carroll, International Environmental Diplomacy, 1988, pp. 141-171.
  31. Ibid., pp. 173-185.
  32. Kai N. Lee, "The Columbia River Basin: Experimenting With Sustainability," Environment, Jul/Aug 1989, p. 10.

33. Thomas W. Lippman, "A Watershed In Debate On Hydropower," Washington Post, 26 January 1992, p. A3.
34. Associated Press, "Owl Plan's Cost: 20,700 Jobs," Washington Post, 26 January 1992, p. A9.
35. Gove, p. 2566.
36. Charles Gallenkamp, Maya, The Riddle and Rediscovery of a Lost Civilization, 1985, pp. 145-153.
37. Clive Ponting, "Historical Perspectives in Sustainable Development," Environment, Nov 1990, p. 7.
38. Thomas Homer-Dixon, "On The Threshold: Environmental Changes As Causes of Acute Conflict," International Security, Fall 1991, p. 80.
39. Lynton K. Caldwell, International Environmental Policy, 1984, p. 16.
40. Robert E. Rhoades, "The Incredible Potato," National Geographic, May 1982, p. 694.
41. Ibid.
42. Homer-Dixon, p. 78.
43. Samuel A. Schreiner, Mayday, Mayday, 1990, p. 97.
44. James Burke, Connections, 1978, pp. 1-3.
45. Homer-Dixon, p. 91.
46. Ibid., p. 93.
47. Ibid.
48. Wiener, p. 130.
49. Thomas Y. Canby, "After The Storm," National Geographic, Aug 1991, p. 16.

50. Sylvia A. Earle, "Assessing The Damage One Year Later,"  
National Geographic, Feb 1992, p. 129.
51. Paul Wallich, "Dark Days: Eastern Europe Brings to Mind the  
West's Polluted Past," Scientific American, Aug 1990, p. 20.
52. Westing, pp. 1 - 107.
53. Mary Ann Tetreault, "Kuwait: The Morning After," Current  
History, Jan 1992, p. 6.
54. Joint Chiefs of Staff, Joint Publication 3-07, p. GL-2.
55. Ibid., p. GL-4.
56. Earle, p. 127.
57. Canby, p. 31.
58. U.S. Army, Army Regulation 525-13, pp. 3-4.
59. Revell, pp. 141-142.
60. Revell, p. 139.
61. Anthony Fainberg, "OTA Report: Technology Assessment,"  
Terrorism, 1991, p. 113.
62. William F.W. Jones, "Terrorism and Electrical Energy  
Interruption: The Role Of The Federal Emergency Management  
Agency," Terrorism, 1990, p. 441.
63. Ibid.
64. Donald A. Devito, "Mass Destruction," Terrorism, 1987, p.  
275.
65. Jones, p. 441.
66. Ibid.
67. Jones, p. 445.
68. Allan J. Behm and Michael J. Palmer, "Coordinating

Counterterrorism: A Strategic Approach To A Changing Threat,"  
Terrorism, July-Sept 1991, p. 171.

69. U.S. Army, Army Regulation 525-13, p. 6.
70. Ibid., p. 16.
71. Ibid., p. 6.
72. U.S. Army, Training Circular 19-16, Countering Terrorism on  
U.S. Army Installations, pp. 4-8.
73. Ibid., pp. E-1 to E-13.



## BIBLIOGRAPHY

Alexander, Yonah and Suchlicki, Jaime, eds., "International Terrorism: Threats and Responses," Terrorism, Vol. 10, No. 1, 1987.

Alexander, Yonah, ed., "Technology Against Terrorism: The Federal Effort," Terrorism, Vol. 14, No. 2, Apr-Jun 1991.

Associated Press, "Owl Plan's Cost: 20,700 Jobs," Washington Post, 26 January 1992.

Badolato, Edward V., "Terrorism and the U.S. Energy Infrastructure," Terrorism, Vol. 13, No. 2, Mar-Apr 1990.

Behm, Allan J. and Palmer, Michael J., "Coordinating Counterterrorism: A Strategic Approach to a Changing Threat," Terrorism, Vol. 14, No. 3, July-Sept 1991.

Brickman, Ronald, et. al., Controlling Chemicals, Ithaca: Cornell University Press, 1985.

Buck, Kathleen, "Superterrorism," Terrorism, Vol. 12, No. 6, 1989.

Burke, James, Connections, Boston: Little, Brown and Co., 1978.

Caldwell, Lynton K., International Environmental Policy, Durham: Duke University Press, 1984.

Canby, Thomas Y., "After the Storm," National Geographic, Vol. 180, No. 2, August 1991.

Carroll, John E. ed., International Environmental Diplomacy, Cambridge: Cambridge University Press, 1988.

Central Intelligence Agency, Annotated Bibliography on Transnational and International Terrorism, Washington, D.C., 1976.

Crane, Alan T., "Physical Vulnerability of Electrical Systems to Natural Disaster and Sabotage," Terrorism, Vol. 13, No. 3, May-June 1990.

Devito, Donald A., "Mass Destruction," Terrorism, Vol. 10, No. 3, 1987.

Earle, Sylvia A., "Assessing the Damage One Year Later," National Geographic, Vol. 181, No. 2, February 1992.

Easton, John J., "Electrical Systems Vulnerabilities," Terrorism, Vol. 13, No. 3, May-June 1990.

Erickson, Richard J., "What International Law Approach Should Be Taken Toward International Terrorism?" Terrorism, Vol. 11, No. 2, 1988.

Fainberg, Anthony, "OTA Report: Technology Assessment," Terrorism, Vol. 14, No. 2, Apr-June 1990.

Fox, William F., ed., "Legal Aspects of Terrorism," Terrorism, Vol. 12, No. 4, 1989.

Freeman, Lawrence and Karsh, Efraim, "How Kuwait Was Won: Strategy in the Gulf," International Security, Vol. 16, No. 2, Fall 1991.

Gallenkamp, Charles, Maya, The Riddle and Rediscovery of a Lost Civilization, New York: Viking Penguin, Inc., 1985.

Gove, Philip B. ed., Webster's Third New International Dictionary, Springfield: G & C Merriam Co., 1965.

Hashim, Ahmed, "Iraq, The Pariah State," Current History, Vol. 91, No. 561, January 1992.

Homer-Dixon, Thomas F., "On The Threshold: Environmental Change As Causes of Acute Conflict," International Security, Vol. 16, No. 2, Fall 1991.

Joint Chiefs of Staff, Joint Publication 3-07: Doctrine For Joint Operations In Low Intensity Conflict. Washington, D.C., 1990.

Jones, William F.W., "Terrorism and Electrical Energy Interruption: The Role of the Federal Emergency Management Agency," Terrorism, Vol. 13, No. 6, Nov-Dec 1990.

Lee, Kai N., "The Columbia River Basin: Experimenting With Sustainability," Environment, Vol. 31, No. 6, Jul/Aug 1989.

Lippman, Thomas W., "A Watershed In Debate On Hydropower," Washington Post, 26 January 1992, p. A3.

Ludwikowski, Rett, "Legal Aspects of Terrorism," Terrorism, Vol. 12, No. 4, 1989.

Mickolus, Edward F. and Flemming, Peter A., Terrorism 1980-1987, A Selectively Annotated Bibliography, New York: Greenwood Press, 1988.

Mochary, Mary, "Legal Aspects of Terrorism," Terrorism, Vol.

12, No. 4, 1989.

Murphy, John F., "The Need For International Cooperation In Combating Terrorism," Terrorism, Vol. 13, No. 6, Nov-Dec 1990.

Netanyahu, Benjamin, Terrorism: How The West Can Win, New York: Farrar, Straus, Giroux, 1986.

Ponting, Clive, "Historical Perspectives on Sustainable Development," Environment, Vol. 32, No. 9, Nov 1990.

Post, Jerrold M., "Superterrorism: Biological, Chemical and Nuclear," Terrorism, Vol. 13, No. 2, Mar-Apr 1990.

Revell, Oliver B., "Structure of Counterterrorism Planning and Operations in the United States," Terrorism, Vol. 14, No. 3, July-Sept 1991.

Rhoades, Robert E., "The Incredible Potato," National Geographic, Vol. 161, No. 5, May 1982.

Roy, Robin, "Physical Vulnerability of Electrical Systems to Sabotage," Terrorism, Vol. 13, No. 3, May-June 1990.

Rubin, Alfred P., "Current Legal Approaches to International Terrorism," Terrorism, Vol. 13, No. 4-5, July-Oct 1990.

Ruster, Bernd and Simma, Bruno, eds., International Protection of the Environment. Treaties and Related Documents, Vol. I to Vol. XXX, Dobbs Ferry: Oceana Publications, 1975.

Schneider, Jan, World Public Order of the Environment, Toronto: University of Toronto Press, 1979.

Schreiner, Samuel A., Mayday, Mayday, New York: Donald I. Fine, Inc., 1990.

Sessions, William S., "The FBI's Mission in Countering Terrorism," Terrorism, Vol. 13, No. 1, Jan-Feb 1990.

Sproat, Peter A., "Can The State Be Terrorist?" Terrorism, Vol. 14, No. 1, Jan-Mar 1991.

Tetreault, Mary Ann, "Kuwait: The Morning After," Current History, Vol. 91, No. 561, January 1992.

U.S. Army, Army Regulation 525-13: The Army Terrorism Counteraction Program, Washington, D.C., 4 January 1988.

U.S. Army, Field Manual 100-20: Military Operations in Low

Intensity Conflict, Washington, D.C., July 1983.

U.S. Army, Field Manual 100-37: Terrorism Counteraction, Washington, D.C., July 1987.

U.S. Army, Training Circular 19-16: Countering Terrorism on U.S. Army Installations, Washington, D.C., April 1983.

Wallich, Paul, "Dark Days: Eastern Europe Brings to Mind the West's Polluted Past," Scientific American, Vol. 263, No. 2, Aug 1990.

Westing, Arthur H. ed., Environmental Warfare: A Technical, Legal, and Policy Appraisal, London: Taylor & Francis, 1984.

Wiener, Stanley L., "Terrorist Use of Biological Weapons," Terrorism, Vol. 14, No. 2, Apr-June 1991.

Wooten, James, "Legal Aspects of Terrorism," Terrorism, Vol. 12, No. 4, 1989.